

Notice of Allowability

Application No.

09/812,956

Applicant(s)

SANDBERG, DAVID

Examiner

Curtis B. Odom

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amdt filed on 11/12/2004.
2. ☒ The allowed claim(s) is/are 1-8, 10, 12-20, 23-25, 27, and 29-35, which have been renumbered claims 1-29.
3. ☒ The drawings filed on 3/27/2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with John R. Lastova on February 28, 2005.

The application has been amended as follows:

Claim 10 (currently amended). A method, comprising:

sampling a signal with a known sequence p_n received over a Rayleigh fading channel;
calculating a Doppler spread associated with the Rayleigh fading channel by
autocorrelating a sequence of complex channel estimates obtained from the known sequence in a first sampling interval and the known sequence in a second sampling interval; and
calculating the autocorrelation using the following:

$$\hat{C}_l = \sum_{k=0}^N (p_k)^* \cdot (p_{k+l})$$

where \hat{C}_l is an autocorrelation function, p_k and p_{k+l} are sequences of complex channel estimates, k is an index, $*$ represents complex conjugate, l is a lag in the autocorrelation

Art Unit: 2634

function, and N is a number of channel coefficients used for estimating the Rayleigh fading channel.

Claim 29 (currently amended). The apparatus in claim 27, further comprising:

means for determining a zero crossing for the autocorrelation function \hat{C}_l .

Claim 30 (currently amended). The apparatus in claim 29, wherein the zero crossing is a first zero crossing determined for the autocorrelation function \hat{C}_l and is determined by interpolation.

EXAMINER'S STATEMENTS OF REASONS FOR ALLOWANCE

2. The following is an examiner's statement of reasons for allowance: Claims 1-8, 10, 12-20, 23-25, 27, and 29-35, which have been renumbered claims 1-29, respectively, are allowable over prior art references because related references do not disclose estimating a Doppler spread associated with a Rayleigh fading channel using an auto-correlation function, using the Doppler spread estimation to estimate the Rayleigh channel, and combining the channel estimation with the received signal to compensate for phase changes caused by Rayleigh fading. Related references also do not disclose calculating the Doppler spread using an autocorrelation function with the following equation: $\hat{C}_l = \sum_{k=0}^N (p_k)^* \cdot (p_{k+l})$ (see above explanation of each variable), or

Art Unit: 2634

detecting a zero crossing of the correlation; and calculating the Doppler spread using the zero crossing and a Bessel function.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 571-272-3046. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Application/Control Number: 09/812,956

Page 5

Art Unit: 2634

Curtis Odom

February 28, 2005



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